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RESEARCH ARTICLE

THE PRODUCTION OF PURE NITRATES OF LANTHANUM, NEODYMIUM, EUROPIUM AND YTTERBIUM SOLUTIONS OF URANIUM IN KAZAKHSTAN

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ABSTRACT

This paper presents the results of the search of complex processing of raw uranium as the development of the production of rare earth metals in Kazakhstan.

INTRODUCTION

When in-situ leaching uranium leach solutions are nearly always the rare earth metals. Actual problem is the development of cost-effective technologies for the extraction of rare earth metals from uranium solutions. Rare earth metals are expensive metals and are widely used in post-combustion catalysts transport emissions and obtaining superconductors. The aim of this work was to obtain pure nitrate, lanthanum, neodymium, europium and ytterbium from productive solutions uranium mine treatment of oxalic acid at a slightly basic solution.

Experimental

Acidic solutions productive uranium deposits (pH = 1,5-2,0) Kazakhstan treated NH4OH solution to increase pH = 6-7,5 and the white precipitate was analyzed by atomic absorption spectrograph.

RESULTS AND DISCUSSION

In physico-chemical laboratory uranium mine "Ak Dala" conducted laboratory tests to obtain pure nitrates of lanthanum, neodymium, europium and ytterbium from their oxides, previously isolated from a uranium mine productive solutions. Analyses were performed on lanthanide nitrates ISP-spektrometetre. The results of the analysis of the pure nitrate, lanthanum, neodymium, ytterbium and europium are presented in Table 1.

As seen from Table 1, the laboratory tests showed that pure lanthanum nitrate, neodymium, europium and ytterbium may be obtained from uranium leach solutions. Thus, we first obtained and identified clean nitrates of lanthanum, neodymium, europium and ytterbium from their oxides, previously isolated from a uranium mine productive solutions "Ak Dala".

Conclusion

This paper presents the results of the search of complex processing of raw uranium as the development of the production of rare earth metals in Kazakhstan. In the future, research will continue on the selection of synthetic ion-exchange resins for the effective adsorption of rare earth elements from uranium industry productive solutions.

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Table 1. Chemical composition obtained nitrates lantonoidov

Element	Mass	Conc.	Counts (CPS)	Примечание
$Yb(NO_3)_3$				
Sc	45	6.200 ug/l	18,431.35	
Co	59	ISTD	2,535,915	
Y	89	Element	5,116.711	
La	139	1.100 ug/l	35,128.07	
Ce	140	5,500 ug/l	2,278.816	
Pr	141	370.0 ng/l	337,1585	
Nd	146	44.00 ng/l	34,012.16	
Sm	147	25.00 ug/l	7,759.345	
Eu	153	6.700 ug/l	20,245.48	
Gd	157	4.800 ug/l	3,349.040	
Tb	159	2.500 ug/l	1,335.864	
Dy	163	160.0 ng/l	480.0256	
Ho	165	230.0 ng/l	664.3246	
Er	166	79.00 ng/l	744.3395	
Tm	169	250.0 ng/l	6,620.259	
Yb	172	730.0 ng/l	269,547,100	
Lu	175	130.0 mg/l	147,757.7	
Bi	209	16.00 ug/l	8,895,674	
$Eu(NO_3)_3$		ISTD		
Sc	45	Element	19,283.16	
Co	59		2,677,689	
Y	89	6.200 ug/l	2,800.344	
La	139	ISTD	204,602.4	
Ce	140	Element	3,356.194	
Pr	141	560.0 ng/l	1,140.079	
Nd	146	30.00 ug/l	3,194.728	
Sm	147	510.0 ng/l	4,323.604	
Eu	153	140.0 ng/l	78,537,830	
Gd	157	2.300 ug/l	2,794.635	
Tb	159	3.500 ug/l	2,074.498	
Dy	163	17.00 mg/l	2,201.666	
Ho	165	1.900 ug/l	45,000.92	
Er	166	230.0 ng/l	387.1608	
Tm	169	990.0 ng/l	43,743.02	
Yb	172	5.000 ug/l	55,195.27	
Lu	175	120.0 ng/l	3,924,939	
Bi	209	4.600 ug/l	9,674,100	
$Nd(NO_3)_3$		25.00 ug/l		
Sc	45	400.0 ng/l	17,648.16	
Co	59	ISTD	2,553,736	
Y	89	Element	26,913.46	
La	139		23,447.16	
Ce	140	5.900 ug/l	46,501.36	
Pr	141	ISTD	91,490.08	
Nd	146	Element	44,124,450	
Sm	147	5.700 ug/l	50,438.37	
Eu	153	3.700 ug/l	133,604.2	
Gd	157	7.500 ug/l	16,705.43	
Tb	159	11.00 ug/l	1,653,546	
Dy	163	33.00 mg/l	124,103.7	
Ho	165	42.00 ug/l	47,899.90	
Er	166	31.00 ug/l	582,924.3	
Tm	169	12.00 ug/l	1,181.515	
Yb	172	190.0 ug/l	29,698.68	
Lu	175	59.00 ug/l	792.9014	
Bi	209	5.600 ug/l	9,093,602	
$La(NO_3)_3$		200.0 ug/l		
Sc	45	130.0 ng/l	29,552.03	
Co	59	14.00 ug/l	2,888,645	
Y	89	86.00 ng/l	192.8641	
La	139	ISTD	352,757,300	
Ce	140	Element	16,709.61	
Pr	141		5,172.462	
Nd	146	8.700 ug/l	1,973.049	
Sm	147	ISTD	188.5794	
Eu	153	Element	4,350.774	
Gd	157	35.00 ng/l	29,500.86	
Tb	159	48.00 mg/l	26,320.80	
Dy	163	2.400 ug/l	357.1608	
Ho	165	590.0 ng/l	44.28726	
Er	166	1.300 ug/l	2,517.437	
Tm	169	140.0 ng/l	127.1476	
Yb	172	890.0 ng/l	13,577.95	
Lu	175	18.00 ug/l	1,040.072	
Bi	209	2.700 ug/l	10,533,550	
		140.0 ng/l		
		5.100 ng/l		
		750.0 ng/l		
		12.00 ng/l		
		5.800 ug/l		
		99.00 ng/l		
		ISTD		
		Element		

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